#632 March 2025

JUG

Publication of the Northern California Contest Club

NCCC

54 years of contesting excellence

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Tue 11 March 2025

Ron, WV4P
"NJ4P Station Planning, Design, and Building"

President's Report

David West, KO6M

As you know, we have started a mentoring program. We've paired those of you who offered help with those who needed it. This was a great outcome from the survey we conducted. I've heard your feedback on many of the other comments, and we're planning to get back to more in-person meetings in the coming months. We will also try to complement them with Zoom meetings, though we can't make any promises, as there have been numerous times we haven't scheduled in-person meetings due to the need for concurrent Zoom meetings. I've heard some great ideas about how we can manage this moving forward.

We also hear that you want more camaraderie. While some of the board members are leaving in April, we're working to ensure the next board can use this feedback to get NCCC back to what YOU want it to be. With that in mind, I challenge some of you — you know who you are — to step up and join the board, or even take on a role such as Secretary, VP/CC, or President. **WE CANNOT DO THIS WITHOUT YOU!** This is your chance to make a real difference in NCCC.

Next on my mind is IDXC. Please consider attending—I've heard it's a fantastic event. I, of course, considered going, but due to family obligations, I won't be able to make it. I want to preemptively thank Chris, John, Greg, and Jeff for working so hard with the others to make this a great event. (If I missed anyone's name and you're helping, THANK YOU!)

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About NCCC

Officers and Directors, 2023-2024 Contest Season

President: David West, KO6M
Vice-President/Contest Chairman: Chris Tate, N6WM
Secretary: Greg Alameda, KK6PXT
Treasurer: Nian Li, WU6P
Past President: David Jaffe, WD6T
Director: Jim Brown, K9YC
Director: John Miller, K6MM
Director: Ed Radlo, AJ6V

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Awards Chair: Gary Johnson, NA6O
California QSO Party Chair: Dean Wood, N6DE
QSL Mgr [K6ZM]: **vacant**
QSL Mgr [K6CQP/N6CQP/W6CQP]: Dean Wood, N6DE
NAQP Teams: v**acant**
NA CW Sprint Teams: Bob Vallio, W6RGG
NCCC Email Reflector Admin: Phil Verinsky, W6PK
Worked All CA Counties Award: Fred Jensen, K6DGW
Photographer: Bob Wilson, N6TV

NCCC Thursday Night Contesting

NCCC Sprint: Tom Hutton, N3ZZ
NS CW Ladder: Bill Haddon, N6ZFO
NS RTTY Sprint/Ladder: Ed Radlo, AJ6V

Communications

Webmaster: John Miller, K6MM
Webinars: Bill Fehring, W9KKN
Membership: Gary Johnson, NA6O/Ian Parker, W6TCP

JUG Editor

Fred Jensen, K6DGW: *k6dgwnv@gmail.com*
Home: 775.501.5488
Cell: 530.210.0778

I believe Jeff (WK6I) is looking for a keynote speaker for the Contest Dinner. Please consider offering your entertaining and educational insights as a potential keynote speaker. Greg will be hosting the hospitality room as usual, and Chris is heading up the Contest Academy.

Lastly, and perhaps most importantly, our Award Lunch: Don't just save the date, **April 5th**, but also plan to attend! It will be at Cattleman's in Livermore. For more details, check the reflector or the emails from Memberplanet. I hope to see you there!

VP/CC

Chris, N6WM

Coming up!

Greetings, fellow Northern California Contesters! Well with the ARRL DX CW and SSB behind us its time to look forward to the WPX contests that start at the end of this month with the WPX SSB contest on March 29th. The CQ WPX contests, under the stewardship of the WWROF are very large worldwide events where many familiar contesters will be masqueraded with unusual "club" call signs domestically and abroad in a quest to be a bit rarer in a contest that treats unique prefixes as multipliers. The second contest in this series, occurring May 24, rings in the end of the traditionally accepted major contest season.

Both of these are NCCC FOCUS CONTESTS and I want to encourage as many of you as possible to get on the air for these. They are loads of fun, and multipliers are everywhere providing for a strangely satisfying score increase cadence! Look for more from me on the reflector as we collectively come together as team NCCC to participate in the WPX contest series!

Its been my honor and privilege to serve as Vice President and contest chairman!

I joined the NCCC in early 2008 as an enthusiastic late bloomer ham in his early 40's. I had a lot to learn about contesting! I was recruited after my involvement in a hilltop station me and a few of my friends put up, with a simple tribander and a vertical. But the location was magical and gave us a big signal in the contests we showed up for. Soon after that I was recruited as a regular member of the N6RO team as well.

During the following 17(!) years, I volunteered as a club officer for the NCCC for 8 years, and served as CQP chair for an additional 2 years. I also served as the lead of the former SNS Thursday night contest for 3 years. Yes, 13 of the last 17 years in NCCC service! Serving in these roles have helped me grow as a better contester, helped me to understand our contesting community better and helped me develop leadership skills and forge connections and networks that I will forever value.

5 of those years were as the Vice President and contest chairman. My first stint as VP/CC was 2010, 3 years after pulling my ham ticket! In those 5 years I have had the pleasure in leading our club to 3 unlimited gavel wins, 2 in ARRL RTTY Roundup, and 1 last year in the ARRL 10m contest. These were great victories for us all!

Its time for someone else to step up and enjoy this great opportunity!

In my opinion the VP/CC is one of, if not the most important and fulfilling club officer positions for our organization. It is also the most fun! You get to work with the BoD to define our club competition and club focus contest agenda Charting our club path for the year! It completes the total contester experience.. we single op.. we join multi-ops.. and now you get to lead an entire major club, with 50 or greater logs into club competition against other clubs worldwide! I'd say that's pretty cool!

So what say? If you are one of the many others who have served in this role in the past, perhaps you would be willing to step into the role once again... If you are intrigued by what I have said and you are thinking about it, DO IT! I will always be available to serve as a mentor as long as I am a member of this club.

Reach out. Make this role yours and be amazed by how it enhances your contesting experience, improves your network of great operators and amateur radio leaders and most importantly contribute to helping this continue to be a great organization!

IDXC Visalia April 11-13th: NCCC Presence, table, Hospitality Suite and Contest Academy 2025 https://dxconvention.com/

Mark your calendars, get a hotel room and head to Visalia! The NCCC is in the house during the 76th International DX convention.

Exhibit hall table

The NCCC will have a table in the Exhibit Hall, and its always great to have NCCC members present to answer questions and spread the word about our great club!

Hospitality suite.. NCCC style

We will once again sponsor the Friday and Saturday night NCCC hospitality suite, providing space, drinks and snacks. Its a place where conversations between contesters of all levels share a drink, camaraderie and the story telling we are all so great at!

Contest Academy

The NCCC Contest academy is once again on!

Friday April 11th from 1-5 pm. We have a great program that you may want to attend or help out our team!

Topics/Instructors

1. **How to have fun contesting in FT modes** -- Instructor Mark Aaker K6UFO
2. **Basic Station Automation Techniques** -- Instructor Bob Wilson N6TV
3. **Remote SO2R/2BSIQ+ mulit-radio contesting via remote** -- Instructor Chris Tate N6WM
4. **contesting while activating POTA including CQP**--Instructor John Owens NN6U
5. **Contesting live workshop**. -- Instructor Hank Garretson W6SX and Chris Tate N6WM

We certainly hope you will be there, and if you would be willing to help with any of these events like staff the table, help out with the hospitality suite or be part of the contest academy faclulty please let us know!

That's all for me this time.

73 es KB
Grandpa Chris, N6WM

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Upcoming Large Contests

NA Sprint SSB	23 Mar 0000Z - 0400Z
CQ WW WPX SSB	**29 Mar 0000Z to 30 Mar 2359Z**
Poisson d'Avril	1 Apr 0000Z to 2359Z
JIDX CW	12 Apr 0700Z to 13 Apr 1300Z
Worked All China Prov DX	19 Apr 0600Z to 20 Apr 0559Z
Volta WW RTTY	10 May 1200Z to 11 May 1200Z
CQ WW WPX - CW	**24 May 0000Z to 25 May 2400Z**

Red entries denote NCCC Focus contest

Weekly CW (1 hr) Events

ID	DAY	UTC	EXCH	WPM	SPONSOR
SST	Fri	2000 - 2100	Name+SPC	<20	K1USN
	Mon	0000 - 0100			
MST	Mon	1300 - 1400	Name+QSO#	20-25	ICWC
	Mon	1900 - 2000			
	Tue	0300 - 0400			
CWT	Wed	1300 - 1400	Name+CWO# or Name+SPC	20->∞	CWops
	Wed	1900 - 2000			
	Thu	0300 - 0400			
	Thu	0700 - 0800			

Thursday FT4 NCCC Sprint

The Northern California Club is again pleased to sponsor our weekly FT4 Sprint, aka FT4NS (NCCC Sprint). This contest is held every Friday UTC between 0100Z and 0130Z (Thursday evening in North America). Non-North American stations are welcome to participate. No logs are necessary; please submit your score to 3830scores.com using the "NCCC FT4 Sprint" template. FT4 NS Sprint Rules are posted at: https://www.ncccsprint.com/ns.html See you on the screen! Frequencies: 1839, 3575, 7047.5 (also 7080), 14080, 21140, 28180, 50318

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NCCC Annual KB Competition Rules

Gary, NA6O

Revised 3 Mar 2025

Current rules and standings are always available at http://nccc.cc/awards.html

Purpose: To provide a means of rewarding NCCC members who are DX contesters, sprinters, VHFers, and especially active contesters in all modes.

Time period: The contest year restarts at 0000 March 1 UTC. ARRL DX SSB is the first contest of the year. NAQP RTTY is the last.

Eligible contests: Currently, points from 28 contests are counted. See the table on the next page.

Scoring: Score = N_Contests * sum of (points for each contest * each contest's multiplier).
Where N_Contests is the number of contests in whcih you participated.
NCCC weekly sprints are special. Points for the entire year are added up, but it is only counted as a single contest.

Multi-ops: Points = total score divided by the number of operators.

Station owners: A station owner who *does not participate* in a particular contest receives 25% of the points.

Valid scores: Only scores posted to 3830scores.com are counted. Scores obtained by use of **High Power** in the 6 NAQP competitions and the weekly NCCC sprints (CW, CW Ladder and FT4) will not be counted for the KB competition, either as scores or as contest multipliers. **A minimum of 25 QSOs** are required in all contests, except for the NCCC sprints. Scores are counted regardless of which club received the contest points (NCCC,

MLDXCC, REDXA, PL259, etc.). The only requirement is that you **must be an NCCC member** to receive credit for the contest.

Awards: Paid NCCC members may receive awards.

How to Improve Your Standing

Post all your scores on 3830. Those are the only ones that count.
Participate! Even the smallest score has value. Every contest on the list is a multiplier.
Try a new mode or a new band (VHF, 10, 160).
Try the sprints. Small score, big multiplier.
Go for a big score in WPX: Exponential score growth.
Join a multi-op: The score is split among ops.
Let someone else use your station: You get 25%.

Comments are welcome, as always. I log and track every comment and suggestion and try to improve the KB Competition each year. The one thing I can guarantee is that each year will be different!

Contact: Gary NA6O, NCCC KB Awards Manager, *gwj@me.com*

KB Competition Contests

There are four independent brackets for the purpose of issuing awards: 1- Platinum, 2- Gold, 3-Silver, and 4-Bronze. Your bracket is assigned automatically at the beginning of the contest year according to your final position in the previous year's standings. Members not listed below default to the Bronze level.

Contest	Date	Mult
ARRL DX Contest SSB	1-Mar	9
CQ WPX SSB	29-Mar	2
7QP	3-May	20
CQ WPX CW	24-May	1
ARRL DX Contest DIGI	7-Jun	250
ARRL June VHF	14-Jun	200
IARU HF World Championships	12-Jul	4
NAQP Summer RTTY	19-Jul	25
NAQP Summer CW	2-Aug	25
NAQP Summer SSB	16-Aug	50
NA Sprint Fall CW	14-Sep	150
CQWW RTTY	27-Sep	1
CQP	4-Oct	10
CQWW SSB	25-Oct	1

Contest	Date	Mult
ARRL Sweepstakes CW	1-Nov	15
ARRL Sweepstakes SSB	15-Nov	15
CQWW CW	29-Nov	1
ARRL 160 Meter Contest	5-Dec	100
ARRL 10 Meter Contest	13-Dec	4
RAC Winter	27-Dec	20
ARRL RTTY Roundup	3-Jan	50
NAQP Winter CW	10-Jan	15
NAQP Winter SSB	17-Jan	15
NA Sprint Winter CW	8-Feb	150
CQ WPX RTTY	14-Feb	2
ARRL DX Contest CW	21-Feb	1
NAQP Winter RTTY	28-Feb	15
NCCC Sprint CW and FT4	Weekly	100

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KB Competition Brackets

There are four independent brackets for the purpose of issuing awards: Platinum, Gold, Silver, and Bronze. Your bracket is assigned automatically at the beginning of the contest year according to your final position in the previous year's standings. Members not listed below default to the Bronze level.

Platinum	Gold	Silver
WD6T	W9KKN	WU7W
KA6BIM	N6XI	KM9R
AJ6V	AD6E	N5KO
W2SC	K6RIM	N6GEO
N6RO	VA7RR	K6TD
N6WM	W6FB	N6EE
WX5S	NO5Z	W6TCP
N6KT	N6TTV	W6SC
N6TV	NW6P	NF6R
N6IE	WB6JJJ	W1SRD
W0YK	KX7M	WU6X
AE6Y	K6SRZ	K6ST
N6ZFO	K8TR	WX6V
K6XX	K3EST	NU6T
NN6U	KE8FT	KW6S
K9YC	KI6OY	W6BG
W1RH	NN7O	ND2T
W6SX	K6MM	K6ELE
WU6P	W6JTI	W7IV
WC6H	K6UFO	N6RK
K6GHA	W6IA	KZ2V
K6TQ	N0KQ	N6DE
K6NV	K6KM	K6CSL
WK6I	N3ZZ	K6MI
AF6SA	W6OAT	NC6R
KK6PXT	KH2TJ	K6KLY
W6LD	N6PN	K6XV
N6DW	N6YEU	W6ATV
K5RC	KE6QR	W6SR
N3RC	KF6NCX	K2RD
K6EI	K6JS	KG7QXE
N7MH	K7GK	K6RC
KO6M	OH1VR	W6DR
W6EU	WE6Z	WN6A
W6NV	NA6O	KG6AO
K6OK	KE6GLA	K6RM
NU6S	KH6LC	K6YLH

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Rotate Your Yagi

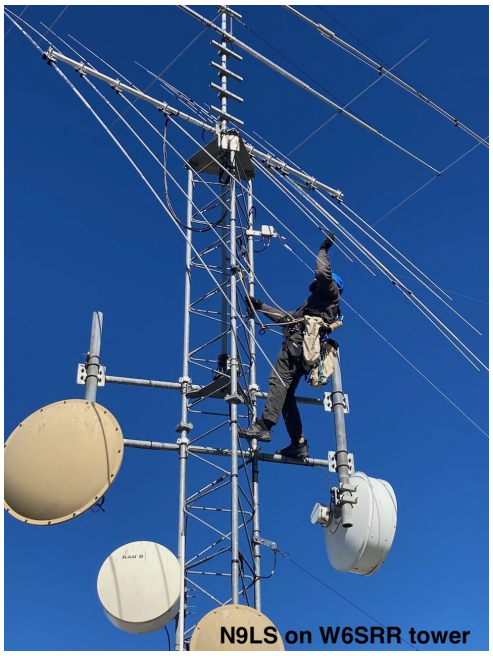
Gary Johnson, NA6O

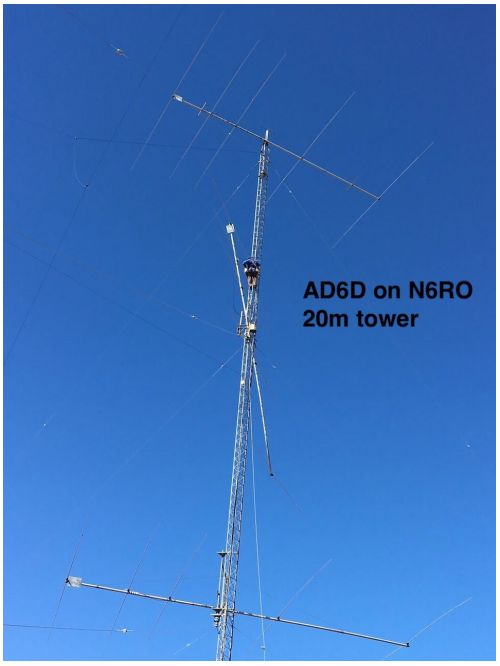
Everyone knows how to rotate their Yagi antenna: Just turn the knob and away it goes. But this article isn't about *that*rotation, it's about rotating it a different way, for maintenance. When your beam has a problem wayy out where you can't reach it, the usual expectation is that the whole thing is going to have to come down off the tower. Many of us have seen balun failures or lost the tip off of an element or had an element twist on the boom, and there's no obvious or easy way to reach it. It's bad enough that we have to hire a climber, and even worse when the work involves tramming the whole shebang down to the ground and back up. Thankfully, professional tower busters have tricks that save us much time and effort. The first time you see it, the light goes on and it's obvious... If only you had thought of if first!

The simplest trick is to rotate the Yagi by loosening the boom in the boom-to-mast clamp, allowing the boom itself to rotate. This lets the elements swing down alongside the tower. Now it's possible to climb up or down and reach at least the elements that are close to the tower. Our local climber Mark, N9LS, did a service call at my station W6SRR where some plastic clips out on the elements had slipped out of position. He was able to reach them and fix the issue easily.

The more elaborate and flexible trick is to dismount the Yagi entirely while temporarily supporting it at its balance point with some combination of slings, ropes, and a come-along. At N6RO, we had a balun failure on a long 20m Yagi and Hector, AD6D, used this method. Once the antenna is free-floating, it's easy to position it at any angle along the tower, allowing access to anything that needs attention.

So be sure to consult the pros when you have a problem up the tower. They may even show you a different way to rotate.


N9LS on W6SRR tower


AD6D on N6RO
20m tower

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Antenna of the Month

Measuring Ground Constants

Gary, NA6O

Ground conductivity and dielectric constant (relative permittivity) directly affect the performance of our antennas. When simulating an antenna, getting these values wrong will result in errors in the pattern and feed point impedance. This is especially true for designs that have elements close to the ground, such as radials, or any kind of low antenna. Results may be so far off as to turn you into a non-believer in simulation when you actually build and test your design.

Simulators like EZNEC include default parameters for various types of ground with names like "extremely poor" and "very good." The corresponding numeric values (also published in the ARRL Antenna Book) are derived from 1939 FCC measurements intended for use in the broadcast band. However, soil parameters vary quite a bit with frequency, thus guaranteeing errors when applied to the HF bands. But you can get better values from a webpage provided by Brian Beezley, K6STI. Brian assembled some charts and tables [Ref 1] that extrapolate those BC band data to the HF bands for much-improved accuracy. It's better to start with that information.

Then there is another matter: What kind of soil do you actually have? The FCC has a map of ground conductivity for the USA [Ref 2]. Once again it's for the BC band so the values need correction, and your particular location could be different due to all sorts of alterations to the local soil and of course moisture content. Also the map only shows conductivity but not permittivity. So this is again only a partial solution.

When in Doubt, Measure It

Yes, you can directly measure your local ground constants. There are at least two ways. One is to use a special dielectric probe that is inserted into the ground and connected to an impedance analyzer [Ref 3]. After applying a formula, reliable results are obtained. Of course you need to make the special probe and it only measures data at single points. But it's an excellent technique.

Another way to do the measurement is with a low dipole [Ref 4]. The beauty of a dipole is that it's easy to build and easy to simulate accurately. Basically you measure it's impedance and then in EZNEC you simulate the antenna geometry exactly and then adjust the ground parameters until the results match. The other advantage of this method is that it averages a large volume of soil. All you need is some wire, insulated supports, and enough space to string it up a few feet above the ground. Height is not important—3 to 5 feet is fine—as long as you *know* the height accurately. Also it will make simulation easier if you run it in a straight line. Finally, you will need a good common-mode choke at the feed point to prevent your (short length of) coax and equipment from becoming part of the antenna [Ref 5]. And of course you need a reliable impedance measurement device that displays complex impedance (R+jX). I used my Rig Expert AA-230 but a NanoVNA or many other instruments are fine.

Some Actual Results

My friend Greg, KK6PXT, has been considering purchase of some new property so I went along to do RFI

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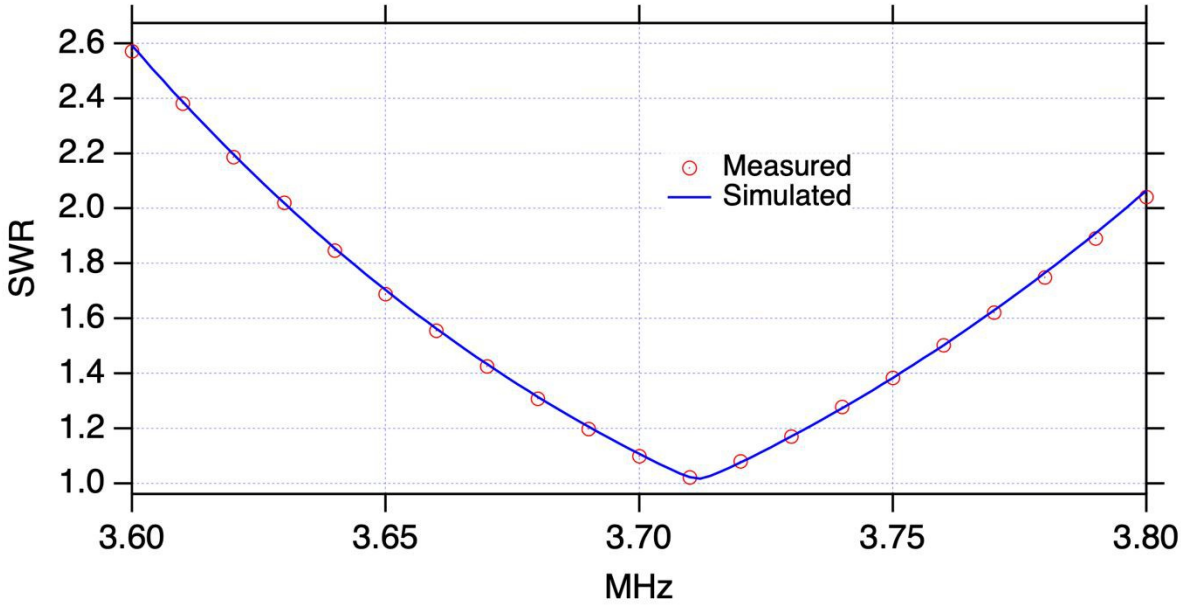
measurements with portable antennas. While I was at it, I put up a full-length 80 m dipole at 4 ft off the ground. It was made from 18 AWG magnet wire and had a good choke at the feed point. When I measured it, resonance was at 3710 kHz and 49.2+j0 ohms. I also saved an SWR scan for later comparison.

The *exact* geometry (including the 3-foot feedline) was simulated in EZNEC using the NEC5 engine and a real/extended accuracy ground. (NEC 2 will be pretty close too; just be sure to use real/high-accuracy ground.) Ground properties were varied by guessing until results perfectly matched simulation; it took me about 15 runs. I was focused on matching the impedance at resonance and finally nailed it. The result was conductivity = .0232 S/m, dielectric constant = 41. In the graph below, SWR data from my antenna analyzer and from the simulation are overplotted. This is a great validation of simulation! If I did not do this measurement, and didn't know better, I'd use the default values for "poor rocky soil", .002/13. That's wayy off, with resonance appearing 6 kHz low and Z = 95+j0.



Now that we know the values on 80 m, we can use the information from Ref. 1 to extrapolate to other bands. It turns out that I could have taken data on other bands while using this same antenna and then run the simulation at those other frequencies, again looking for matching impedances. In that case you do have to watch out for extremely high or low impedances where your analyzer may exhibit large errors.

Conclusion

Don't trust the generic default values for ground constants. At the very least, use the estimates discussed here. Or dig into your junk box and put up a simple dipole, then spend some quality time with EZNEC. You may want to repeat the test in wet and dry conditions as well. At last, you will have accurate ground data for your property and future simulations will be much more accurate.

Additional Comments Regarding Accuracy

I had some discussion with Brian Beezley and he noted that like any metrology endeavors, the absolute accuracy of this measurement depends on more than just the wire geometry. First, the end insulators and even the small loops of wire have to be accounted for. Actually, minimizing them is probably the way to go. A miniscule insulator made from a small-diameter rod of low-loss polymer (e.g., polystyrene, Teflon, polyethylene) or fiberglass would be ideal. Then the loop of wire may also be negligibly small.

The other thing is your connection to the analyzer. Excess capacitance from cables and connectors must be included in the simulation or somehow minimized to a negligible level. Hand or ground capacitance is also a problem. Rudy found that his VNA had to be elevated off the ground with no hand contact, otherwise results would vary. My best solution is to solder the antenna wires directly into an N connector that's plugged into my Rig Expert analyzer. After pressing the start button, I can let go of it and walk away while it does its slow scan. Residual capacitance is very small, and there is essentially no feedline at all.

References

1. Brian Beezley, K6STI, "HF Ground Constants" *http://ham-radio.com/k6sti/hfgc.htm*

2. FCC, "M3 Map of Effective Ground Conductivity in the United States for AM Broadcast Stations"

3. Rudy Severns, N6LF, "Measurement of Soil Electrical Parameters at HF" *https://rudys.typepad.com/files/qex-nov-dec-2006-soil-parameters-at-hf.pdf*

4. Rudy Severns, N6LF, "Determination of Soil Electrical Characteristics Using a Low Dipole." QEX, Nov/Dec 2016. *https://rudys.typepad.com/files/qex-nov-dec-2016-soil-characteristics-using-low-dipole.pdf*

5. Jim Brown, K9YC, "A New Choke Cookbook for the 160-10m Bands" *http://k9yc.com/2018Cookbook.pdf*

April Meeting/Elections

Greg, KK6PXT – Secretary

Save the Date...**Saturday April 5th 2025**.. Cattlemens Restaurant, Livermore. 11:00 am to 3:00 pm. Official invite will be sent via Member Planet.

KEEP AN EYE OUT

And, since the meeting is early in the month and it is elections and awards, the JUG will publish on Wed, 9 April in order to include results of the elections and the annual awards

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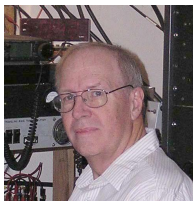
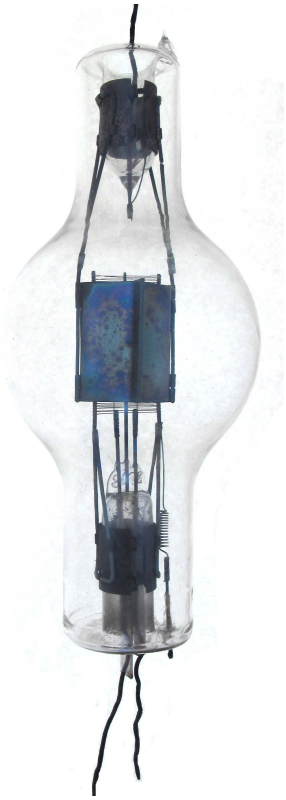
Tube of theMonth

Norm Wilson, N6JV
Visit the Tube Museum at *n6jv.com*

WD-24



Westinghouse was one of the first American companies to commercially produce vacuum tubes. RCA held the triode patent so Westinghouse and General Electric made tubes for distribution by RCA. These companies also developed experimental tubes for their own use and to develop new products and perfect construction techniques. The featured transmitting triode was found at a swap meet. I don't think I paid much as nobody knew what it was other than an early, primitive triode that was probably made about 1920. Eventually I identified it as a Westinghouse WD-24, but I have no reference source to prove it. All tube collectors have a library of reference material and I think someone knew what it was and supplied the operating voltages and currents. The plate could be run as high as 2000 volts at 250 ma. The filament was 10 volts at 15 amps. The tube stands 12 inches tall. Westinghouse tubes had several prefix codes and often WD was used to indicate a developmental tube.



This tube was made by spot welding rods to support the plate and grid. The ends were connected to internal metal clamps. In operation, the tube was mounted with straps. This system is similar to what *de Forest* tubes of this period used. The feature that doesn't make any sense is the square box shaped plate. Making the spacing between the grid and plate uniform, minimizes the creation of hot spots The variable grid to plate spacing may result in an odd-looking set of performance curves. This design didn't catch on but it is an interesting example of early experimentation.

Ed. Note: 500 watts wasn't too shabby for 1920

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Coconuts and Isotropic Antennas

We somewhat casually employ the concept of an isotropic antenna [one that radiates energy equally in all directions] as a reference against which to measure the "gain" of other antennas. For example, the common dipole is said to have 3dB gain over isotropic, or 3 dBi. "Gain" is a misnomer since it's achieved by increasing the radiated energy in one or more directions at the expense of radiated energy in other directions. We all quietly accept that isotropic antennas do not actually exist for a lot of vague reasons … feeding power to it, it would have to be supported somehow, etc. But, just because we can't figure out how to make one doesn't mean they don't exist. Proving that requires mathematics, and there **is** a proof.

The venerable Scientific American magazine will often include a few small scientific tidbits, puzzles, and recreations near the back of each issue. In fact, in years past, Martin Gardnet [SK] wrote over 250 consecutive columns for "Mathmatical Games", one of the most loved features in the magazine. Since his retirement, others have contributed to the monthly issues, and for the March 2025 issue, Jack Murtagh presented a topological theorem known as the "Hairy Ball Theorem" and at last, we know for certain that while isotropic radiators might make a good reference point when thinking, they really, no fooling, cannot exist.

> ***"You might be surprised to learn that you can't comb the hairs flat on a coconut without creating a cowlick. Perhaps even more surprising, this silly claim with an even sillier name, 'The Hairy Ball Theorem,' is a proud discovery from a branch of math called topology. Juvenile humor aside, the theorem has far reaching consequences in meteorology, radio transmission and nuclear power."***
>
> *Jack Murtagh, Sci Am Pg 80 Mar 2025*

We can get a feel for the effect even though it's fairly complex. Electromagnetic radiation has an electric field coupled to a magnetic field and the fields are perpendicular to each other as the wave propagates. The logical shape for an isotropic radiator is a conductive sphere. Elecric fields must always meet conductive surfaces perpendicularly … if the E-field had a component parallel to the surface, the surface would "short it out" so to speak. Since the magnetic field must also be perpendicular to the electric field, the magnetic field lines must be tangent to the surface of the sphere everywhere … i.e. the electric field lines radiate outward and the magnetic field lines wrap tightly around the sphere, and, the Hairy Ball Theorem tells us that that can never happen on a sphere or any object topologically equivalent to a sphere [see coconut]. There will always be some place on the spherical surface where the magnetic lines will not lie flat ["the cowlick"]. The magnetic lines are not tangential to the surface at the cowlick which would force the electric field lines to not be perpendicular to the surface, and we know that's not possible, ergo isotropic radiators do not physically exist.

Jack Murtagh points out that this is not the only ramification of the Hairy Ball T.heorem Fusion reactions create incredibly hot plasmas which must be contained by magnetic fields. Since anything spherical will have a cowlick, there will always be a place in a container where the plasma will "leak" out destroying the container. A bit oddly, a torus [doughnut shape] can be proved to be free of the cowlick problem. Hence, the containment vessels and the toroidal magnetic fields in them can contain the plasma of the reaction, and nearly all fusion research today takes place in doughnut shaped containers. Now you know why.

Editor Notes

As this issue was being laid out, word reached East Sparks that Chris, N6WM, has just become a grandfather! Rumors are that he's already enrolled his new grandson in licensing classes and the CW Academy. He'll be learning his way around Oakley and N6RO soon. See photos in Chris' report if you havent already.

NCCC elections will be coming up at the 5 April Luncheon meeting at Cattlemens in Livermore. It's also the annual NCCC awards meeting and always fun! <K6DGW>

W7RN FOR SALE

Due to escalating medical issues, K5RC and K7AFO will be moving to a retirement community outside Houston in summer 2025. We would like to sell to a Contester/DXer to continue the legacy of W7RN. The station has been dubbed *"Every Ham's Dream."*

Details can be found at *www.w7rn.com/w7rn-for-sale*

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NCCC Membership Information

If you wish to join NCCC, please fill out an application for membership, which will be read and voted upon at our monthly meeting. To join, you must reside within club territory which is defined as everything in California north of the Tehachapi's up to the Oregon state line, and part of northwestern Nevada (anything within our ARRL 175-mile radius circle centered at 10 miles north of Auburn on Highway 49).

Life Memberships

Life memberships are $250.00 Contact secretary.nccc@gmail.com. Members who have reached 80 years of age have and been an NCCC member for 20 or more years are eligible for Honorary Life Membership ("80/20 Rule"). Contact secretary.nccc@gmail.com

JUG Articles Wanted!

Your help allows us to produce a quality newsletter. Please consider submitting an article! The editor welcomes any and all relevant articles for inclusion in the JUG. The preferred format is plain, unformatted ASCII text, MS Word (.doc/.docx) are acceptable. Indicate the insertion point and title of diagrams and pictures in the text and attach photos/diagrams separately. Pictures should be as high a resolution as available. Please do not spend time formatting your submittal, the publication templates will re-format everything. Send your material to *k6dgwnv@gmail.com* indicating "JUG Submittal" in the subject.

Northern California Contest Club Reflector—Guidelines

The NCCC email reflector is devoted to the discussion of contesting. Topics include contests, station building, dxpeditions, technical questions, contesting questions, amateur radio equipment wants/sales, score posting, amateur radio meetings/ conventions, and membership achievements. Postings may not include personal attacks, politics, or off-subject posts. Such postings will be considered a violation of the Guidelines

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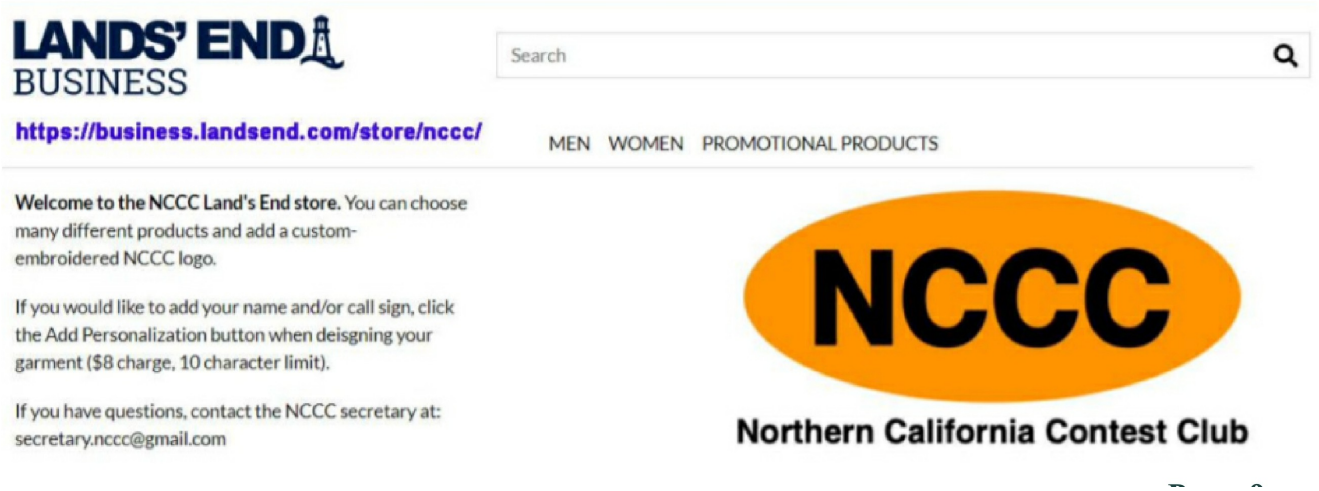
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If you have questions, contact the NCCC secretary at: secretary.nccc@gmail.com
NCCC
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NCCC Lands' End Store

We are pleased to announce that the new NCCC Land's End store is online! You can choose from an array of shirts, jackets, and hats and apply your choice of custom-embroidered NCCC logos: A plain one, or one that also says Fifty Years. And, you can personalize your item by adding your name and/or call sign. The store is open 24/7 and items are shipped directly to you. No more waiting for everyone else to make up their minds on a group purchase.

https://business.landsend.com/store/nccc/ or from the NCCC website: http://nccc.ccc/members/lestore.html
Thanks to W6TCP for helping to set this up. Instructions for purchases from Lands' End NCCC Store

1. Go to https://business.landsend.com/store/nccc/
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3. Pick color, inter quantity of each size you want to order.
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Single or dual panadapter, plus a high-resolution tuning aid

The main panadapter can be set up as single or dual. Separate from the main panadapter is our per-receiver *mini-pan* tuning aid, with a resampled bandwidth as narrow as +/- 1 kHz. You can turn it on by tapping either receiver's S-meter or by tapping on a signal of interest, then easily auto-spot or fine tune to the signal.

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